

IN THE CLAIMS:

Please CANCEL claims 12, 14-16, 30, 36 and 38 without prejudice to or disclaimer of the recited subject matter.

Please AMEND claims 11, 27, and 31-34, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1 - 10. (Cancelled)

11. (Currently Amended) A projection optical system comprising:

a plurality of lenses that cause birefringence; and

at least one optical element for having a stress distribution, the stress distribution substantially eliminating the birefringence caused by said plurality of lenses, wherein said at least one optical element is disposed between said plurality of lenses and an image plane of said projection optical system.

12. (Previously Presented) An optical system according to claim 11, wherein said at least one optical element has form birefringence.

13-17. (Cancelled)

18. (Previously Presented) A projection exposure apparatus comprising:

an illumination system for illuminating a reticle with light; and

a projection optical system for projecting a pattern of the reticle onto a wafer, said projection optical system including a plurality of lenses that cause birefringence, and at least one optical element for substantially eliminating the birefringence caused by said plurality of lenses, wherein said at least one optical element is disposed between said plurality of lenses and an image plane of said projection optical system.

19. (Original) A projection exposure apparatus according to claim 18, wherein said illumination system illuminates the reticle with slit-like light, and further comprising a scanning device for simultaneously scanning the reticle and the wafer in a widthwise direction of the slit-like light, at a speed ratio corresponding to a projection magnification of said projection optical system.

20. (Previously Presented) A projection exposure apparatus according to claim 18, wherein said at least one optical element has form birefringence.

21. (Cancelled)

22. (Previously Presented) A projection exposure apparatus according to claim 20, wherein said at least one optical element produces the form birefringence by a grating having a period smaller than a wavelength used.

23. (Cancelled)

24. (Previously Presented) A projection exposure apparatus according to claim 18, wherein said at least one optical element has a stress distribution.

25. (Previously Presented) A projection exposure apparatus according to claim 24, wherein said at least one optical member is arranged so that a distribution, including a distribution of stresses produced by said at least one optical member, is effective to cancel the birefringence of said plurality of lenses.

26. (Previously Presented) A device manufacturing method comprising the steps of:  
exposing a wafer to a device pattern by use of a projection exposure apparatus as recited in claim 18; and  
developing the exposed wafer.

27. (Currently Amended) A projection optical system comprising:

a plurality of lenses that cause birefringence; and

at least one optical element for having a stress distribution, the stress distribution substantially eliminating the birefringence caused by said plurality of lenses, wherein said at least one optical element is disposed near a pupil of said projection optical system.

28. (Previously Presented) A projection exposure apparatus comprising:

an illumination system for illuminating a reticle with light; and

a projection optical system for projecting a pattern of the reticle onto a wafer, said projection optical system having a plurality of lenses that cause birefringence, and at least one optical element for substantially eliminating the birefringence caused by said plurality of lenses, wherein said at least one optical element is disposed near a pupil of said projection optical system.

29. (Previously Presented) A device manufacturing method, comprising the steps of:

exposing a wafer to a device pattern by use of a projection exposure apparatus as recited in claim 28; and

developing the exposed wafer.

30. (Cancelled)

31. (Currently Amended) An optical system according to Claim 27, wherein said at least one optical ~~elements comprise a plurality of lenses each having birefringence and element comprises~~ at least one element having a stress distribution.

32. (Currently Amended) A projection exposure apparatus according to Claim 28, wherein said at least one optical ~~elements comprise element comprises~~ a plurality of lenses each having birefringence and at least one element having form birefringence.

33. (Currently Amended) A projection exposure apparatus according to Claim 28, wherein said at least one optical ~~elements comprise a plurality of lenses each having birefringence and element comprises~~ at least one element having a stress distribution.

34. (Currently Amended) An optical system according to claim ~~12~~ 11, wherein the amount of birefringence of said at least one optical element is substantially the same as the amount of birefringence of said plurality of lenses as a whole, and wherein the sign of birefringence of said at least one optical element is opposite to the sign of said plurality of lenses as a whole.

35. (Previously Presented) An apparatus according to claim 20, wherein the amount of birefringence of said at least one optical element is substantially the same as the amount of

birefringence of said plurality of lenses as a whole, and wherein the sign of birefringence of said at least one optical element is opposite to the sign of said plurality of lenses as a whole.

36. (Cancelled)

37. (Previously Presented) An apparatus according to claim 32, wherein the amount of birefringence of said at least one optical element is substantially the same as the amount of birefringence of said plurality of lenses as a whole, and wherein the sign of birefringence of said at least one optical element is opposite to the sign of said plurality of lenses as a whole.

38. (Cancelled)

39. (Previously Presented) A projection exposure apparatus according to claim 32, wherein said at least one optical element produces the form birefringence by a grating having a period smaller than a wavelength used.

40. (Previously Presented) A device manufacturing method, comprising the steps of:  
exposing a wafer with a device pattern by use of a projection exposure apparatus as recited in claim 32; and  
developing the exposed wafer.

41. (Previously Presented) A device manufacturing method, comprising the steps of:

exposing a wafer with a device pattern by use of a projection exposure apparatus  
as recited in claim 33; and  
developing the exposed wafer.

42. (Previously Presented) A device manufacturing method, comprising the steps of:

exposing a wafer with a device pattern by use of a projection exposure apparatus  
as recited in claim 35; and  
developing the exposed wafer.

43. (Previously Presented) An optical system according to Claim 11, wherein said at least one optical element comprises a transparent plane plate.

44. (Previously Presented) A projection exposure apparatus according to Claim 18, wherein said at least one optical element comprises a transparent plane plate.

45. (Previously Presented) An optical system according to Claim 27, wherein said at least one optical element comprises a transparent plane plate.

46. (Previously Presented) A projection exposure apparatus according to Claim 28,  
wherein said at least one optical element comprises a transparent plane plate.